

## **Louisiana's Water Quality Assessment Method and Summary Data/Integrated Report Rationale**

### **Introduction**

This summary of Louisiana's water quality assessment methods and Integrated Report (IR) development procedures is taken from the IR Rationale submitted to USEPA in support of Louisiana's 2008 IR. The IR is developed in order to meet reporting requirements of the Federal Water Pollution Control Act (33 U.S.C. §1313 and 40 CFR Chapter 1 §130.7), commonly known as the Clean Water Act (CWA) (Federal Water Pollution Control Act (FWPCA), 1987). Specifically, assessment results for this IR satisfy requirements of §303(d) and §305(b) of the CWA. Reports under §303(d) and §305(b) must be prepared every even-numbered year. Following current United States Environmental Protection Agency (USEPA) guidance, these two reports are now combined into one Integrated Report. This rationale includes descriptions of changes made to Louisiana's IR since the 2006 cycle, along with the reasoning behind those changes. Changes to the IR for 2008 are based on new ambient water quality data collected from 1 January 2004 through 30 October 2007. During the 2005 ambient monitoring rotation, there was little ambient sampling occurring in the area affected by Hurricane Katrina; therefore, the period from 29 August 2005 when Hurricane Katrina came ashore and 23 September 2005 when Hurricane Rita came ashore did not include any sampling from the area affected by Katrina. In addition, due to rapidly shifting priorities following Hurricanes Katrina and Rita, little or no ambient monitoring was conducted statewide. All ambient data collected following Hurricanes Katrina and Rita that was suspected of being impacted by post-hurricane conditions was "flagged" in the database and not used for ambient water quality assessments.

Section 303(d) of the CWA requires the identification, listing, and ranking for development of Total Maximum Daily Loads (TMDLs) for waters that do not meet applicable water quality standards after implementation of technology-based controls. Section 305(b) of the CWA requires, among other items, a description of all navigable waters in each state and the extent to which these waters provide for the protection and propagation of fish and wildlife and allow for recreational activities in and on the water (33 U.S.C. §1315(b) et seq.) All assessments were prepared using existing and readily available water quality data and information in order to comply with rules and regulations under §303(d) of the Act (33 U.S.C. §1313 and 40 CFR Chapter 1 §130.7). In most cases, water quality assessments and possible §303(d) listing are based on specific water body subsegments as defined in Louisiana's Environmental Regulatory Code (ERC) 33:IX.1123, table 3 (ERC, 2007). Additional data and information were solicited during a 30-day data request public notice period which ended 4 December 2007. A second 30-day data request period, targeted to additional state and federal agencies, was initiated on 4 December 2007 and ended 2 January 2008. Additional data was provided by the Sabine River Authority, Lake Pontchartrain Basin Foundation, and USEPA Region 6. This data was considered in conjunction with ambient water quality data collected by LDEQ.

The 2008 IR contains new assessments for subsegments in all twelve Louisiana basins: Atchafalaya (01), Barataria (02), Calcasieu (03), Pontchartrain (04), Mermentau (05), Vermilion/Teche (06), Mississippi (07), Ouachita (08), Pearl (09), Red (10), Sabine (11), and Terrebonne (12). Louisiana's water quality monitoring and assessment program follows the four-year rotating basin approach shown in table 1. For the 2007 monitoring cycle, LDEQ changed from a calendar year rotation to a "water-year" rotation of October – September. This permits a full twelve months of water quality data to be collected in sufficient time to generate the Integrated Report by April 1st of even-numbered years.

LDEQ's four-year rotation monitoring program has a number of benefits over previous monitoring programs:

1. Water quality data from the same number of water bodies was collected over a shorter period of time, thus improving LDEQ's ability to identify and target newly developing problems in a timely manner.
2. Samples were collected statewide instead of in two or three basins per year, enabling LDEQ to monitor water quality issues on a broader regional scale.
3. Regional staff responsible for collection of samples remained skilled and up-to-date on the latest sampling procedures.
4. Regional staffs were able to balance their workloads more evenly instead of having two or three years in which they do little or no ambient water quality sampling and one year of intense field sampling at the expense of all other work.

**Table 1**

**Monitoring and assessment schedule for Louisiana's four-year rotating basin plan**

<b>Basin</b>	<b>First Monitoring Rotation</b>	<b>Second Monitoring Rotation</b>
Atchafalaya Basin (01)	2004, 2005	2008, 2009
Barataria Basin (02)	2004, 2005	2008, 2009
Calcasieu River Basin (03)	2004, 2005	2008, 2009
Lake Pontchartrain Basin (04)	2006, 2007	2010, 2011
Mermentau River Basin (05)	2004, 2005, 2006, 2007	2008, 2009, 2010, 2011
Vermilion-Teche River Basin (06)	2004, 2005, 2006, 2007	2008, 2009, 2010, 2011
Mississippi River Basin (07)	2004, 2005	2008, 2009
Ouachita River Basin (08)	2004, 2005	2008, 2009
Pearl River Basin(09)	2006, 2007	2010, 2011
Red River Basin (10)	2004, 2005, 2006, 2007	2008, 2009, 2010, 2011
Sabine River Basin (11)	2006, 2007	2010, 2011
Terrebonne Basin (12)	2004, 2005	2008, 2009

**2008 Water Quality Assessment Procedures**

**General Assessment Procedures**

Assessment procedures used for Louisiana's 2008 IR have been developed and updated over a number of years for use in previous §305(b) reports. Procedures follow USEPA guidance documents for §305(b) reports and §303(d) lists (USEPA, 2005), USEPA's Consolidated Assessment and Listing Methodology (CALM) guidance (USEPA, 2002), as well as Louisiana's surface water quality standards found at ERC 33:IX.1101-1123. Assessment procedures remain largely the same as were used for the 2006 IR. Additional details of Louisiana's Integrated Report assessment process can be found in Louisiana's *Standard Operating Procedures for Production of Water Quality Integrated Report. Revision 2.* (LDEQ, 2007). Deviations from previous procedures will be noted in the following description of assessment processes.

For the 2008 IR assessment, field staff collected monthly field analysis and laboratory samples. Laboratory samples were sent to LDEQ's water laboratory in Baton Rouge (conventional parameters), one of several Louisiana Department of Health and Hospitals (LDHH) laboratories (fecal coliform bacteria), or a contract lab (metals). In order for water quality or other related data to be utilized for §305(b) reporting and §303(d) listing, sample collection, handling, and laboratory analysis must be in accordance with LDEQ's Quality Assurance Project Plan developed by LDEQ and approved by USEPA Region 6. Data from the LDEQ laboratory as well as field data were entered into LIMS (Laboratory Information Management System) by laboratory staff. After electronic data deliverables from the laboratory were received, these data were electronically entered into the Oracle-based Louisiana Environmental Assessment Utility (L'EAU) database, maintained on a central LDEQ server by the Standards, Assessment and Nonpoint Source Section (SAN), Water Quality Assessment Division (WQAD), Office of Environmental Assessment (OEA). Data from LDHH and the contract laboratory were also entered into L'EAU by SAN staff. Field parameters measured using water quality instrumentation were entered by hand from field data sheets completed by regional LDEQ personnel responsible for ambient water quality sampling. All ambient water quality data used for this assessment can be obtained by following directions found on the LDEQ web site at: <http://www.deq.louisiana.gov/portal/Default.aspx?tabid=2421>. In addition to water quality data collected by LDEQ, additional data and information were solicited from the public and other state and federal agencies.

At the beginning of this assessment cycle, L'EAU and Statistical Analysis Software (SAS) programs were reviewed and updated as necessary to reflect changes in time frame, subsegments assessed, criteria, and assessment methods. A series of L'EAU data queries was run and the resulting data transferred to a series of SAS statistical programs. SAS programs are utilized to compare ambient numerical data to criteria for each water body subsegment and designated use. Louisiana Water Quality Standards define eight designated uses for surface waters: primary contact recreation (PCR), secondary contact recreation (SCR), fish and wildlife propagation (FWP), drinking water supply

(DWS), shellfish propagation (SFP), agriculture (AGR), outstanding natural resource (ONR), and limited aquatic and wildlife use (LAW). Designated uses and criteria for each water body subsegment are listed in Louisiana's ERC 33:IX.1123. Designated uses have a specific suite of ambient water quality parameters used to assess their support. Links between designated uses and water quality parameters, as well as water quality assessment procedures, can be found in table 2. Data and information collected from within or immediately downstream of a water body subsegment were used to evaluate each of the subsegment's designated uses, using the decision process shown in table 2. Where more than one parameter and criterion define a designated use, support for each use was defined by the designated use's poorest performing parameter (most severely impaired). In rare cases where data from more than one sample station were available for the same subsegment, a case-specific determination was made as to how to use the data. These case-specific discussions will be described in detail in the draft and final 2008 Integrated Report.

To illustrate this point, most water bodies have the designated use of FWP. Fish and wildlife propagation is assessed, as noted in table 2, using criteria for the ambient sampling parameters dissolved oxygen, pH, temperature, chloride, sulfate, and TDS, as well as several metals and organic compounds. In the case of subsegment LA030305\_00, Contraband Bayou, only the FWP criterion for dissolved oxygen was not met based on requirements of table 2. Therefore, only dissolved oxygen was reported as an impairment to FWP in the 2008 IR. Had turbidity or some other parameter also shown impairment, that impairment would have been listed as well.

**Table 2**

**Decision process for evaluating use support, showing measured parameters for each designated use;  
Louisiana's 2008 Integrated Report (see footnote 6)**

Designated Use	Measured Parameter	Support Classification for Measured Parameter		
		Fully Supporting	Partially Supporting <sup>2</sup>	Not Supporting
Primary Contact Recreation (PCR)  (Designated swimming months of May-October, only.)	Fecal coliform <sup>1</sup>	0-25% do not meet criteria	-	>25% do not meet criteria
	Temperature	0-30% do not meet criteria	>30-75% do not meet criteria	>75% do not meet criteria
	Toxics	< 2 exceedances of chronic or acute criteria in most recent consecutive 3-year period, <sup>5</sup> or 1-year period for newly tested waters	-	2 exceedances of chronic or acute criteria in most recent consecutive 3-year period, <sup>5</sup> or 1-year period for newly tested waters

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Designated Use	Measured Parameter	Support Classification for Measured Parameter		
		Fully Supporting	Partially Supporting <sup>2</sup>	Not Supporting
Secondary Contact Recreation (SCR)  (All months)	Fecal coliform <sup>1</sup>	0-25% do not meet criteria	-	>25 % do not meet criteria
	Toxics	< 2 exceedances of chronic or acute criteria in most recent consecutive 3-year period, <sup>5</sup> or 1-year period for newly tested waters	-	2 exceedances of chronic or acute criteria in most recent consecutive 3-year period, <sup>5</sup> or 1-year period for newly tested waters

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Designated Use	Measured Parameter	Support Classification for Measured Parameter		
		Fully Supporting	Partially Supporting <sup>2</sup>	Not Supporting
Fish and Wildlife Propagation (FWP)	Dissolved oxygen (routine ambient monitoring data) <sup>3</sup>	0-10% do not meet criteria	>10-25% do not meet criteria	>25% do not meet criteria
	Dissolved oxygen (follow-up continuous monitoring data) <sup>3</sup>	Footnote 3.	Footnote 3.	Footnote 3.
	Temperature, pH, chloride, sulfate, TDS, turbidity	0-30% do not meet criteria	>30-75% do not meet criteria	>75% do not meet criteria
	Metals <sup>4</sup> and Toxics	< 2 exceedances of chronic or acute criteria in most recent consecutive 3-year period, <sup>5</sup> or 1-year period for newly tested waters	-	2 or more exceedances of chronic or acute criteria in most recent consecutive 3-year period, <sup>5</sup> or 1-year period for newly tested waters

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Designated Use	Measured Parameter	Support Classification for Measured Parameter		
		Fully Supporting	Partially Supporting <sup>2</sup>	Not Supporting
Drinking Water Source (DWS)	Color,	0-30% do not meet criteria	>30-75% do not meet criteria	>75% do not meet criteria
	Fecal coliform <sup>1</sup>	0-30% do not meet criteria	-	>30 % do not meet criteria
	Metals <sup>4</sup> and Toxics	< 2 exceedances of drinking water criteria in most recent consecutive 3-year period, <sup>5</sup> or 1-year period for newly tested waters	-	2 or more exceedances of drinking water criteria in the most recent consecutive 3-year period, <sup>5</sup> or 1-year period for newly tested waters
Outstanding Natural Resource (ONR)	Turbidity	0-10% do not meet criteria	>10-25% do not meet criteria	>25% do not meet criteria
Agriculture (AGR)	None	-	-	-
Oyster Production (SFP)	Fecal coliform <sup>1</sup>	Median fecal coliform $\leq$ 14 MPN/100 mL; and $\leq$ 10% of samples $\leq$ 43 MPN/100 mL	-	Median fecal coliform > 14 MPN/100 mL; and > 10% of samples > 43 MPN/100 mL
Limited Aquatic and Wildlife (LAW)	Dissolved oxygen <sup>3</sup>	0-10% do not meet criteria	>10-25% do not meet criteria	>25% do not meet criteria

**Table 2**

**Decision process for evaluating use support, showing measured parameters for each designated use; Louisiana's 2008 Integrated Report (see footnote 6)**

Designated Use	Measured Parameter	Support Classification for Measured Parameter		
		Fully Supporting	Partially Supporting <sup>2</sup>	Not Supporting
<div>1. For most water bodies, criteria are as follows: PCR, 400 colonies/100 mL; SCR, 2,000 colonies/100 mL; DWS, 2,000 colonies/100 mL; SFP, 43 colonies/100 mL (see ERC 33:IX.1123).</div> <div>2. While the assessment category of “Partially Supporting” is included in the SAS statistical assessment programming, any use support failures were recorded in ADB as “Not Supporting.” This procedure was first adopted for the 2002 §305(b) cycle because “partially supported” uses receive the same TMDL treatment as “not supported” uses.</div> <div>3. In the event that analysis of routine ambient monitoring data for dissolved oxygen results in partial- or non-support, continuous monitoring (CM) data, where available, was used for follow-up assessment. CM data was evaluated as follows: All of the 15-minute interval dissolved oxygen observations were analyzed to determine if more than 10% of the data points were below minimum criteria. Water bodies that fell below the criteria greater than 10% of the time were reported as IRC 5 and, therefore, are on the §303(d) list. Water bodies that fell below the criteria less than or equal to 10% of the time were placed in IRC 1, fully supported. If ambient monitoring indicated impairment and CM data was not available for analysis, the water body was placed in IRC 5 until such time as CM data can be collected during the critical season of May 1 through October 31.</div> <div>4. Determination of the application of marine or freshwater metals criteria was made based on ERC 33:IX.1113.A.C.6.d.</div> <div>5. For the 2008 Integrated Report, data for some subsegment assessments was collected in the first year, 2004, of the four-year rotating basin monitoring program. Because of this four-year rotation, metals and toxics data from this first year was included for assessment even though it is outside the normal three-year period for metals and toxics assessments. This ensures that new metals and toxics assessments were developed for subsegments monitored in the first year of the four-year rotation.</div> <div>6. Where deviations from the decision process described in table 2 occur, detailed information will be given to account for and justify those deviations. For instance, circumstances that may not be accounted for in the plain electronic analysis of the data will be explored and may be used to either not list the water body or to put the WIC into a different category. Those circumstances will be fully articulated.</div>				

Numerical data from LDEQ's ambient water quality monitoring network collected between 1 January 2004 and 30 October 2007 were compiled for each assessment. Under Louisiana's four-year rotating basins monitoring approach, this provided twelve monthly samples for most water body subsegments. Up to four years (48 samples) of data were available for those subsegments with long-term trend monitoring sites. For most parameters and criteria, at least five samples were required for the assessment to be considered valid. Parameters collected quarterly (metals and organics) required a minimum of three samples. Ambient data used for analysis depended on the designated use(s) for each water body and the availability of numerical water quality criteria.

Following statistical determination of a water body's designated use support and what chemical parameters in that water body may be impaired, a preliminary determination was made as to which Integrated Report Category (IRC) the suspected water body impairment combination (WIC) should be placed in. A WIC is simply one impairment affecting one water body subsegment. For example, low dissolved oxygen, an impairment on subsegment LA030305\_00, Contraband Bayou, is one WIC. In this case the WIC is an impairment to the designated use of FWP. In addition to this impairment, Contraband Bayou is also affected by the WIC of fecal coliform impairing the designated use of PCR. USEPA guidance permits the placement of suspected WICs into one of seven IR categories. Integrated Report Categories, to which these WICs may be assigned, are described in table 3.

**Table 3**

**Environmental Protection Agency Integrated Report categories used to categorize water body/pollutant combinations for Louisiana's 2008 Integrated Report**

<b>IR Category (IRC)</b>	<b>IR Category Description</b>
IRC 1	Specific Water body Impairment Combination (WIC) cited on a <i>previous</i> §303(d) list is now attaining all uses and standards.
IRC 2	Water body is meeting <i>some</i> uses and standards but there is insufficient data to determine if uses and standards <i>associated with the specific WIC</i> cited are being attained.
IRC 3	There is insufficient data to determine if uses and standards <i>associated with the specific WIC</i> cited are being attained.
IRC 4a	WIC exists but a TMDL has been completed for the <i>specific WIC</i> cited.
IRC 4b	WIC exists but control measures other than a TMDL are expected to result in attainment of designated uses <i>associated with the specific WIC</i> cited.
IRC 4c	WIC exists but a pollutant (man-altered or man-induced impairment) does not cause the <i>specific WIC</i> cited.
IRC 5	WIC exists for one or more uses, and a TMDL is required for the <i>specific WIC</i> cited. IRC 5 represents Louisiana's §303(d) list.

**Determination of Suspected Sources of Impairment**

In addition to the use of numerical data, LDEQ regional staff members were asked for input regarding significant suspected sources of impairment or whether impairment was due solely to natural sources. It was anticipated that numerical data alone might suggest impairment for some Louisiana water bodies when in fact there was no impairment, or the impairment was due exclusively to natural causes. In all cases, regional staff familiar with the area would be able to suggest one or more suspected sources for a water body's impairment. Using the best professional judgment of regional staff provides valuable input regarding the quality of individual water bodies. If an impairment was strongly suspected by regional staff to have been caused by natural conditions (not man-altered or man-induced) then the preliminary IRC was changed from 5 to 4c. In such cases a Use Attainability Analysis (UAA) or other water quality survey may be required. This will be determined upon further investigation by LDEQ. In cases where there is uncertainty as to the suspected cause but no anthropogenic sources are strongly suspected then IRC 2 was used. This will allow for additional investigation into the possible sources as well as a determination of the need for a UAA.

**Data Management of Assessment Results**

All resulting assessment information, including water body name, size, type, designated uses, use support, suspected causes, and suspected sources of impairment, were entered into a database developed for the USEPA by RTI. (Formerly known as Research Triangle Institute, RTI is an USEPA contractor for computer technology.) States are encouraged by USEPA to use this Assessment Database (ADB) in order to provide more consistent reporting at a national level. LDEQ has been using ADB since 2002. For 2008, the IRC for each WIC was included in the "User Flag" field of the "Cause" data entry screen. Additional information regarding each water body, including TMDL due date, TMDL status, monitoring information, and federal Hydrologic Unit Code (HUC), can also be input to ADB. Due to time limitations during this reporting cycle, this information has not yet been consistently recorded in ADB for all water bodies; however, all required information for the IR and water quality assessment process has been included. LDEQ hopes to add the remainder of this ancillary information to the ADB system following completion of the 2008 IR in order to facilitate easier monitoring, assessment, and TMDL tracking.

### **2008 §303(d) List Development and Other IR Categorizations**

The 2008 §303(d) list represents a compilation of four different sources of information:

1. The 2006 Integrated Report
2. New data assessments for all twelve Louisiana basins
3. All recent TMDL activities occurring during or after development of the 2006 §303(d) list
4. All water bodies under new or existing fish consumption or swimming advisories

In addition to drawing from these various sources and assigning IRCs to the suspected causes of impairment, USEPA's current guidance on IR development was used to determine what water bodies were formally included on Louisiana's 2008 list (IRC 5). Using USEPA's IR guidance, all suspected WICs identified in the 2008 IR were assigned to one of seven categories (table 3).

It is important to note that removal of a water body from the §303(d) list (IRC 5), for any reason, does not remove water quality protections from that water body. All water bodies in Louisiana, listed or not listed, are subject to the same protections under the CWA and Louisiana's Environmental Quality Act (LEQA) (LEQA, 1995). Permitted facilities are still subject to conditions of their permits. Unpermitted point source dischargers are still required to obtain a permit or face enforcement actions. Violators of permit conditions are still subject to enforcement action. And, contributors to nonpoint sources of pollution are still encouraged to follow best management practices as developed by LDEQ's Nonpoint Source Program and its many collaborators. Dischargers to water bodies removed from the §303(d) list because TMDLs have been developed are still required to meet permit limits based on the TMDL that was developed for that water body.

USEPA's IR guidance was used to categorize specific suspected WICs in order to narrow the focus on which impairments require development of a TMDL for each assessed water body subsegment. If necessary, suspected WICs placed in IRC 2, 4b and 4c will be addressed with additional monitoring to determine if use impairment is occurring, or if the suspected impairment can be addressed by corrective actions other than development of a TMDL. In some cases, usually related to fish consumption or swimming advisories on small water bodies lying within a larger regulatory subsegment, the smaller "advisory" water body was also named in the 2008 IR. Impairments of this nature are water body-specific issues not directly related to the overall subsegment. These smaller water bodies are not named as a regulatory subsegment and, therefore, were not assessed for any uses other than the specific advisory in question.

Use of IRC 1-4c by Louisiana is not meant to imply that a water body subsegment placed in these categories for specific WICs was explicitly excluded from IRC 5 (the 303(d) list). To the contrary, a water body with one or more specific WICs assigned to an IRC of 1-4c was included in IRC 5 as well, provided one or more WICs for that water body have been placed in IRC 5. Therefore, according to USEPA IR guidance, water bodies with one or more WICs assigned to IRC 5 are explicitly on the §303(d) list. However, these water bodies are only on the §303(d) list for WICs assigned by Louisiana specifically to IRC 5. IR Categories 1-4c were also used by Louisiana in its Integrated Report as a means to classify and account for WICs found on USEPA's Consent Decree §303(d) list. These categories were also used to account for newly identified impairments, not assigned to IRC 5, that are caused by natural sources or for which control activities other than TMDLs are in place.

### **Conclusion**

Due to the extensive nature of documentation used to assess water quality in Louisiana, it was impossible to provide all the data or information used in preparation of this 2008 IR. Anyone interested in viewing this documentation, or anyone with questions regarding the 2008 Integrated Report is asked to contact Mr. Albert E. Hindrichs at:

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